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A
FAMILIAR INTRODUCTION
TO
BOTANY.





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BOTANY.

Illustrated with
COPPER-PLATES.

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BOTANY is that branch of natural history, which treats of plants, their classes, subdivisions, various genera and species. The science of botany is differently explained by different authors; but the two systems of Tournefort and Linnæus more especially de-

serve our consideration. It is to be observed, that Linnæus has established a new system of botany, founded on the number and different structure observable in the male and female parts of generation of each plant; the former of which is called stamen, or stamina, when there are more than one of them; and the latter pistil.

Stamina, according to the generality of botanists, are the male organs of generation in flowers. Geoffrey and Linnæus explain the generation of plants in a manner analogous to that of animals, and maintain

the use of the stamina to be that of secreting, in their fine capillary canals, a juice, which being collected, hardened, and formed into a farina, or dust, in the tips of the apices upon the tops of the pistil, whence is a passage for it to descend into the uterus, where, being received, it impregnates and fecundifies the plant. This doctrine, however, is opposed by some of the writers of the present age, and particularly by Dr. Alston, professor of botany at Edinburgh, who, in an express dissertation on the sexes

of plants, undertakes to overthrow all the arguments in favour of the sexes of plants, by repeated experiments.

Pistil, as already observed, denotes the female organ of generation in plants : it consists of three parts, the germen, style, and stigma ; the germen supplies the place of an uterus in plants, and is of various shapes, but always situated at the bottom of the pistil, and contains the embryo seeds : the style is a part of various forms also, but always placed on the germen : and the stigma is also of various figures, but always

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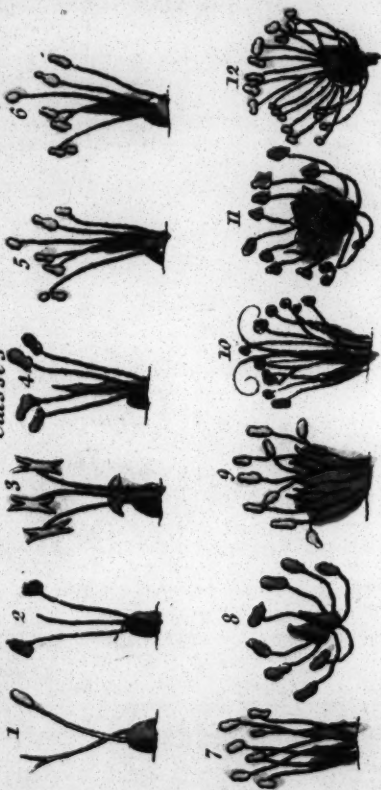
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The Linnæan System of Botany.

Plate 2.

Classes



placed on the top of the style, or, if that be wanting; on the top of the germen.

From the number and situation of the stamina, Linnæus has arranged the whole family of plants under twenty-four classes.

1. The Monandria.
2. Diandria.
3. Triandria.
4. Tetrandria.
5. Pentandria.
6. Hexandria.
7. Heptandria.
8. Octandria.
9. Enneandria.
10. Decandria.

11. Dodecandria.
12. Icosandria.
13. Polyandria.
14. Didynamia.
15. Tetradynamia.
16. Monadelphina.
17. Diadelphia.
18. Polyadelphia.
19. Syngenesia.
20. Gynandria.
21. Monoecia.
22. Dioecia.
23. Polygamia.
24. Cryptogamia.

THE MONANDRIA

Is a class of plants, with only one stamen or male part in each

The Linnean System of Botany.

Plate 3.

Classes



13



14



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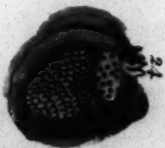
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flower. To this class belong canna, &c.

THE DIANDRIA

Is a class of plants comprehending all those with hermaphrodite flowers, and only two stamina on each; such are sage, olive, and jessamin, rosemary &c.

TRIANDRIA

Is a class of plants that comprehends all such plants as have hermaphrodite flowers, with three stamina, or male parts in each. To this class belong the

tamarind, valerian, saffron, gladiol, iris, &c.

TETRANDRIA

Is a class of plants, comprehending all such plants as have hermaphrodite flowers, with stamina, or male parts in each.

PENTANDRIA,

One of Linnæus's classes of plants, comprehending those which have hermaphrodite flowers with five stamina or male parts in each. To this genus belongs the vine, the elm, &c.

HEXANDRIA,

A class of plants, comprehending all those which have hermaphrodite flowers, and six stamina on each. To this class belong the narcissus, garlic, daffodil, lily, &c.

HEPTANDRIA,

A class of plants, comprehending those that have hermaphrodite flowers and seven stamina in each.

OCTANDRIA,

A class comprehending those plants which have hermaphro-

dite flowers, and eight stamina or male parts in each.

ENNEANDRIA,

A class of plants with hermaphrodite flowers, and nine stamina, or male parts in each. To this class belong the laurus, rheum, spondias, and butomos.

DECANDRIA,

A class of plants having hermaphrodite flowers with ten stamina in each.

DODECANDRIA,

The eleventh order of plants, contains all those with hermaphrodite flowers, and eleven stamina in each ; such are agrimony, afarum, &c.

ICOSANDRIA.

A class of plants, the twelfth in order: the cup of the flower is monophyllous and hollow, with the corolla affixed by the ungues to its sides, and about twenty stamina inserted either into the side of the cup or the corolla. To this class belong the cactus or torch thistle, the amygdalus or almond-tree, the cherry, &c.

POLYANDRIA,

A class of plants, the thirteenth in order, with herma-

phrodite flowers, and a large number of stamina, or male parts in each: these always exceed the number of twelve, and grow on the receptacle of the future seed.

DIDYNAMIA.

A very comprehensive class of plants, and the fourteenth in order; the essential characteristic of which is, that there are four subulated stamina, inserted into the tube of the flower; two of which are shorter than the others, and placed together. To this genus belong baum, germander, lavender, thyme,

betony, mint, basil, fox-glove,
&c.

TETRADYNAMIA,

A class of plants whose flowers have four of their stamina of more efficacy than the rest: these are always known by having the four efficacious stamina longer than the rest.

MONADELPHIA,

A class of plants, the sixteenth in order: the stamina of the flowers are so interwoven as to form one body. To this class belong the mallow, alcea, althæa, and hibiscus.

DIADELPHIA,

The seventeenth class of plants ; comprehending all those with papilionaceous and hermaphrodite flowers, and leguminous seed vessels.

POLYADELPHIA,

A class of plants, the eighteenth in order, whose stamina are connected together at their bases into several serieses.

SYNGENESIA,

The nineteenth class of plants, according to Linnæus ; so called because the stamina

in these plants grow together or are formed into a single regular congeres.

GYNANDRIA,

A class of plants, the twentieth in order: comprehending all those whose stamina are placed either on the style or the receptacle, elongated into the form of a style, and carrying on it both the pistil and stamina.

MONOECIA,

The twenty-first in order of Linnæus's class of plants; in which the male and female flowers are placed separately

on the same plant, or rather on different stalks growing from the same root.

DIOECIA,

In the Linnæan system, is the twenty-second class of plants, comprehending all those which have the male and female parts of fructification, or the stamina and pistil on distinct plants of the same kind ; in which respect they bear some analogy to quadrupeds, whose sexes are likewise distinct.

POLYGAMIA,

The twenty-third class of plants; the characters of which are, that they have flowers of different structure; some having male flowers, others female, and others hermaphrodite.

CRYPTOGAMIA,

The twenty-fourth in order of Linnæus classes of plants; the organs of fructification of which are either concealed within the fruit itself, or are so minute, as to escape observation. To this genus belongs

the mosses, Mushrooms, ferns, liver-worts, &c.

Such are the general classes of plants established by that excellent botanist, Linnæus: who farther subdivides them into orders from the number of pistils, &c. The same celebrated naturalist has also distributed the vegetable part of the creation into different orders, from the form and structure of the calyx, or cup, of their flowers; for the particulars of which we refer the reader to his *genera plantarum*.

Having thus briefly explained

the system of Linnæus, we come to that of Tournefort, which is founded on the different structure and disposition observable in the flowers, or, more strictly speaking, the flower-leaves of plants.

All plants are ranged, by Tournefort, under one or other of the following classes, viz.

1. Plants with monopetalous, campaniform, or bell-fashioned flowers.

2. Those with monopetalous, infundibuliform, or funnel-like flowers,

3. Plants with anomalous monopetalous flowers.

4. Plants with polypetalous labiated flowers.

5. Plants with polypetalous cruci-form flowers.

6. Plants with polypetalous rosaceous flowers.

7. Plants with polypetalous, rosaceous, and umbellated flowers.

8. Plants with caryophyllous, or pink-like flowers.

9. Plants with liliaceous, or lily-like flowers.

10. Plants with polypetalous, papilionaceous flowers.

11. Plants with polypetalous, anomalous flowers.

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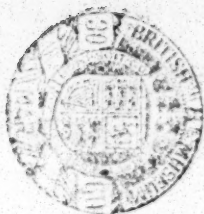
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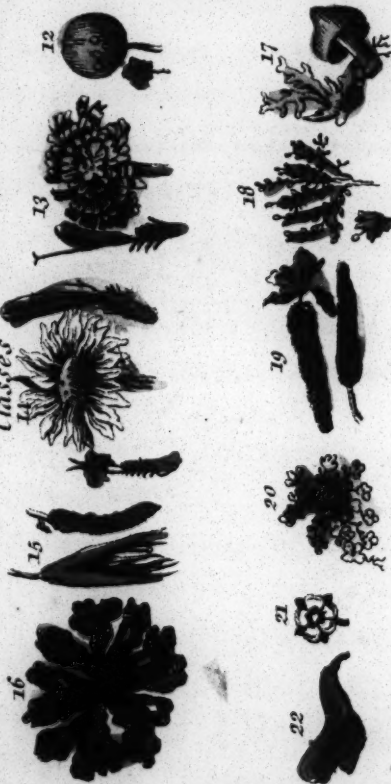
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Tourneforts System of Botany.

Plate 5.

Classes



12. Plants with flosculous flowers.

13. Plants with semi-flosculous flowers.

14. Plants with radiated flowers.

15. Plants with staminous flowers.

16. Plants without flowers, but having visible seeds.

17. Plants with neither visible flowers nor seeds.

18. Trees with apetalous flowers.

19. Trees with apetalous amentaceous flowers.

20. Trees with monopetalous flowers.

21. Trees with rosaceous flowers.

22. Trees with papilionaceous flowers.

The most eminent botanists among the ancients were

Hippocrates,

Theophrastus,

Dioscorides,

Pliny,

Galen, &c.

In the sixteenth century, the ancient botany was revived by

Leonicenus,

Brasavolus,

Cordus,

Fuchsius,

Mathiolus,

Dalechampius, &c.

They were soon after joined by others, and, by their industry, botany was first reduced into a body, or system ; as

Gesner,

Dodonæus,

Cæsalpinus,

Clusius,

Lobel,

Columma,

Prosper Alpinus,

The two Bauhins,

Plunket,

Bucconi, &c.

21. Trees with rosaceous flowers.

22. Trees with papilionaceous flowers.

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The two Bauhins,

Plunket,

Bucconi, &c.

These were succeeded by others, who have laboured successively to bring the science of botany still nearer to perfection.

Among these are

Morrison,
Malpighi,
Hermannus,
Ray,
Magnol,
Tournefort,
Sloane,
Sherrard,
Boerhaave,
Linnæus,

And many others.

As a further Illustration of this delightful Science, we have selected from a valuable little work, in which Botany is most agreeably defined—an explanation of the parts of fructification in Vegetables.*

The fructification includes the flower and fruit, and contains the whole process of perfecting the seeds. It consists of seven parts; and, to illustrate them, I have sketched some particulars from the lily, &c.

1. The (calyx) cup, or em-
palement, *a.*

* Mrs. Wakefield.

2. The (corolla) blossom, petals, or flower-leaves, *b*.
3. The (Stamina) threads or chives, *c*.
4. The (pistillum) style or pointal, *d*.
5. The (pericarpium) seed vessel, *e*.
6. The seed or fruit, *f*.
7. The (receptaculum) receptacle, or base, *g*.

Some flowers possess all these parts, others are deficient in some of them ; but the chives or the pointals, or both, are essential, and to be found in all, either in flowers on the same

plant, or in different individual flowers of the same species, on separate plants. I shall give you as clear a description of these several parts as I possibly can, to enable you to distinguish them at first sight. The cup, empalement, or calyx (*a*), is that outer part of the flower, formed of one or more green, or yellowish green leaves, sustaining the corolla at the bottom, and inclosing it entirely, before it expands, as you may remark in the Rose and Geranium, the latter of which I have sketched for an illustration.

The empalement is either

A cup, as in the polyanthus,
A fence, as in the hemlock or
carrot,

A catkin, as in the willow or
hazle,

A sheath, as in the narcissus,
A husk, as in oats, wheat, or
grasses,

A veil, as in mosses,

A cap, as in mushrooms,

The blossom, petals, or corolla (*b*), is that beautiful coloured part of a flower, which first draws the attention, and is regarded by common eyes as the flower itself; but botanists, more strict in their definitions, appropriate that term to

to the composition of the whole of the fructification, of which the corolla is only a part.

The threads, or chives, are composed of two parts; one long and thin, by which they are fastened to the bottom of the corolla, called the filament; the other thicker, placed at the top of the filament, called anthera, or anther. Each anther is a kind of box, which opens when it is ripe, and throws out a yellow dust, that has a strong smell; this is termed pollen or farina, and is the substance of which bees are supposed to

make their wax. The progress of the seed to maturity is deserving the most curious attention. First, the calyx opens, then the corolla expands and discovers the stamens, which generally form a circle within the petals, surrounding the pointal. The pollen or dust, which bursts from the anthers, is absorbed by the pointal, and passing through the style, reaches the germ, and vivifies the seed, which, without this process, would be imperfect and barren. The stamens, pointal, and corolla, having performed their respective of-

fices, decline and wither, making room for the seed-bud, which daily increases, till it attain its perfect state. Many curious experiments have been made by attentive naturalists, that prove the necessity of this communication between the stamens and pointals of the same flower, in order to render its seeds productive. The stamens and pointal being sometimes disposed on different plants, the trial may be made by shutting up a pot of those which have pointals only, in some place where they cannot

be reached by the pollen of the stamens of other individual plants, and experiment has constantly shown, that no seed is produced in this situation; but how shall we account for the conveyance of the pollen from one plant to another, growing at a distance from it? They are both fixed, and cannot approach each other; yet nature, ever abounding in resources, has provided sufficient means for the purpose. It is probable that there is an attraction between them, which we may imagine, but cannot perceive; this attractive quality

may draw the pollen, floating about in the air, as it is waisted by the winds, to the pointals of its own species; or, in many cases, the numerous tribes of minute winged insects, which we observe so busily employed in a warm day, basking and hovering upon the flowers, may soon convey this fertilizing dust from one to another, and, whilst they are feasting upon the delicious honey afforded by these flowers, return the favour, by rendering, them an essential service.

The style, pointal, or pistil, is composed of three parts

(Plate I.): the germen, the style, and the stigma. The germen varies, as to its form, in different plants, but is always placed below the style; its office is to contain the embryo seeds. The style is placed on the germen, and is of a variety of figures and lengths, and sometimes seems wholly wanting. The stigma also appears of different forms, but always retains the same situation, being invariably placed at the top of the style; or, if that be wanting, it is fixed on the germen.

The seed vessel, or pericar-

pium, is the germen of the pistil enlarged, as the seeds increase in size, and approach nearer perfection. (Plate I.) The seed vessel is divided into seven kinds :

Capsule, as in poppy and convolvulus,

Pod, as in wallflower and honesty,

Shell, as in pea and broom,

Berry, as in elder and gooseberry,

Fleshy, as in apple and pear,

Pulpy, as in cherry and peach,

Cone, as in fir and pine.

The seeds, or fruit, resemble

the eggs of animals, and are the essence of the fruit, containing the rudiments of a new vegetable. The formation of the seed is variously, adapted to its purpose, and is composed of several parts: 1st, The heart: this is the principle of life in the future plant, contained within the lobes; it consists of two parts, the plume, which ascends, and forms the future stem; and the beak which descends and becomes the root. 2dly, The side lobes; these supply the heart of the seed with nourishment, till it is capable of extracting support from the earth.

In most plants the lobes ascend in the form of leaves, and are called seed or radicle leaves; but, in some, they perish beneath the surface, without appearing above ground. 3dly, The Scar; is an external mark, where the seed was fastened within the seed vessel. 4thly, The seed-coat is a proper cover to some seeds. It is of various texture and consistence in different individuals. Sometimes the seed is crowned with the cup of the flower, and sometimes it is winged with a feather, or with a thin expanded membrane, which assists the

wind to waft or disperse it to a distance. The seed contains the perfect plant in embryo, though in most instances, too minute to be discerned by our organs of sight ; but if the seed of a bean or an acorn be sufficiently soaked in warm water, the form of the future plant may be plainly perceived.

The base, or receptacle (*g*), is that part by which the whole fructification is supported ; in many flowers it is not very striking, but in others it is large and remarkable, as in the cotton thistle (*h*). The artichoke will also furnish us with

an example: take away the empalement, blossoms, and bristly substances, and the part remaining is the receptacle, which we eat, and call the bottom.

It remains for me to describe the nectarium, nectary, or honey cup, an appendage with which some flowers are furnished, containing a small quantity of sweet honey-like juice, from which the bees collect their rich treasures. It is very conspicuous in some flowers, as the nasturtium, crown imperial, columbine, and larkspur; but less visible in others, and in

some, appears to be entirely wanting. In the dove-footed cranes-bill, there are five yellowish glands (*i*), which serve as a nectary. The use is supposed to be that of a reservoir, for the nourishment of the tender seed bud.

The wisdom of Providence in the formation of the different plants to their respective purposes described; Crown Imperial, Stock Gilliflower and Pea.

The young Botanists, in their morning and evening rambles, should endeavour to reflect on the pleasing objects presented

to their sight, not only in a botanical point of view, but by making themselves, acquainted with the peculiar uses of the different parts of their structure, to perceive and admire the proofs of divine wisdom exhibited in every leaf and in every flower. Common beholders see these things constantly without observing them; how happy am I to have an instructress and guide, who teaches me to use my eyes, and exert those faculties which nature has bestowed upon me. The flowers which I have selected as examples, for examination, are

THE CROWN IMPERIAL,
the Stock Gilliflower, and the
Pea; the last, is chosen on account of the wonderful means used in its construction, for the preservation of those parts, necessary to perfect the fruit or seed. The first appears in March, but you must wait patiently for the others, till the time of their blooming arrives, which will afford you the advantage of watching their progress from the first appearance of the bud, to the perfecting the seeds; nor can you judge accurately, of several of the parts, but by this daily examination, as they

change their form and appearance in different stages of the maturity of the flower. Gather a crown imperial as soon as you perceive one blown ; if you observe it closely, you will find that it has no cup or empalement ; pull off the beautifully coloured scarlet, or sometimes yellow, petals, which form the corolla, one by one, and you will find that there are six of them. The corollas of many flowers are formed of one petal, as the Canterbury Bell, and are, on that account, called Monopetalous. But those that have more petals

than one in their corollas, are termed Polypetalous. Observe a sort of little column, rising exactly in the middle of the corolla, and pointing upwards. This taken in its whole, is the pointal; but by a nice inspection, you will find it divided into three parts; The oblong, three cornered, swollen base, which is the germ or ovary, the style or thread placed upon this, crowned by the stigma with three notches. Between the pointal and the corolla, six other bodies will claim your notice, which you will readily guess are the sta-

mens, composed of filaments and anthers. Continue your visits to some other individual flower of the same kind, till the petals wither and fall off, and you will perceive that the germ increases, and becomes an oblong triangular capsule, within which are flat seeds in three shells. Behold the pericarp under the form of this capsule. I had like to have forgotten to mention the honey-cup, which may be found at the bottom of the petals, in the form of a little hole. The willow wren creeps up the stems of this plant, and

sips the drops of honey as they hang from the petals. After having carried you through the various parts of a Crown Imperial, I will introduce a

STOCK GILLIFLOWER

to your acquaintance, which, I hope, will afford you as much entertainment as the flower already examined. It is necessary that I should remark, that our stock must be a single one. Those fine purple double stocks that we prized so highly last summer, would have been totally disregarded by a botanical student, who considers all double flowers, either as the sport of nature,

or the effect of art, and consequently improper for his investigation. In the examination of this flower, the first thing that you will see is the calyx, an exterior part, which was wanting in the Crown Imperial. In the stock, it consists of four pieces, which we must call leaves, leaflets, or folioles, having no proper name to express them by, as we have of petals, for the pieces that compose the corolla. These leaflets are commonly unequal by pairs. That is, there are two opposite and equal, of a smaller size,

and two others also opposite and equal, but larger. This calyx contains a corolla, composed of four petals. I say nothing of their colour, because that makes no permanent part of their character. Each of these petals is fastened to the receptacle, or bottom of the calyx, by a narrow pale part, called the claw of the petal, and this spreads out over the top of the calyx, into a large, flat, coloured piece, distinguished by the name of lamina, or the border. Admire the regularity, of the corolla of the flowers of this tribe. The petals

grow generally wide of each other, and exactly opposite to one another, forming a figure resembling that of a cross, which has given them the name of cruciform, or cross-shaped. The petals of the corolla, and the leaflets of the calyx are situated alternately; and this position prevails in all flowers, in which is a correspondent number of petals and leaflets. In the centre of the corolla is one pistil or pointal, long and cylindric, chiefly composed of a germ, ending in a very short style, and that terminated by an oblong stigma, which is bifed, or divid-

ed into two parts; that are bent back on each side. It remains now to speak of the stamens; there are six of them, two, shorter than the other four, opposite to each other, these are separated by the rest, as are also the others in pairs.

When the corolla withers, the germ grows considerably in length, and thickens a little as the fruit ripens; when it is ripe, it becomes a kind of flat pod, called silique. This silique is composed of two valves, each covering a small cell, and these cells are divided by a thin partition. When the seeds are

ripe, the valves open from the bottom upwards, to give them passage, and remain fast to the stigma at top. Then you may discover the flat round seeds ranged along each side of the partition, and you will find that they are fastened alternately, to right and left, by a short pedicle, or footstalk, to the sutures or edges of the partition. The great number of species in this class, has determined botanists to divide it into two sections, in which the flowers are perfectly alike; but there is a material difference in the fruits, pericarps, or seed vessels.

THE PEA FLOWER.

On examining this elegant and wonderful blossom, you will observe that the calyx is of one piece, divided at the edge into five segments, or distinct points, two of which are wider than the other three, and are situated on the upper side of the calyx, whilst the three narrower ones occupy the lower part. The corolla is composed of four petals, the first is broad and large, covering the others, and standing, as it were, on the upper part of the corolla, to de-

fend and shelter it from the injuries of the weather in the manner of a shield ; by way of pre-eminence, it is called the Standard, or Banner. In taking off the standard, remark how deeply it is inserted on each side, that it may not easily be driven out of its place by the wind. The side petals, distinguished by the name of wings, are exposed to view by taking off the banner. They are as useful in protecting the sides of the flower, as the banner is in covering the whole. Take off the wings, and you will perceive the keel, called so on ac-

count of its fancied resemblance to the shape of the bottom of a boat; this incloses and preserves the centre of the flower from harm, which its delicate texture might receive from air and water. If you are curious to examine the contents of this little casket, slip the keel gently down, and you will discover a membrane, terminated by ten distinct threads, which surround the germ, or embryo of the legume or pod. Each of these threads or filaments is tipped with a yellow anther, the farina of which covers the stigma, which terminates the style,

or grows along the side of it. The filaments form an additional defence to the germ, from external injuries. As the other parts decay and fall off, the germ gradually becomes a legume or pod. This legume is distinguished from the silique of the cruciform tribe, by the seeds being fastened to one side only of the case or shell, though alternately to each valve of it. Compare the pod of a pea and a stock together, and you will immediately perceive the difference. The footstalk which supports this flower is slender, and easily moved by the wind.

In wet and stormy weather, the pea turns its back to the storm, whilst the banner enfolds the wings, by closing about them, and partly covers them; they perform the same office to the keel, containing the essential parts of the fructification. Thus is this flower curiously sheltered and defended from its natural enemies, rain and wind; and, when the storm is over, and fair weather returns, the flower changes its position, as if sensible of the alteration, expands its wings, and erects its standard as before. Wonderful are the means of preserva-

tion used by the all-wise Creator to defend the tender and important parts of the fructification of plants from injury; but he seems to have provided in an especial manner, for the security of those, which serve as nourishment to men and animals, as does the greater part of the leguminous or pulse kind. I imagine, by this time, that you are pretty well acquainted with the several parts that compose a flower, and would recognise them, though in an individual that was an utter stranger to you. Confirm your knowledge by practice, and do

not suffer a day to pass without amusing yourself in dissecting some flower or other.

Botany would be a most fatiguing and almost unattainable science, were we obliged to learn the peculiarities of every plant, one by one ; but the difficulty ceases, or at least is greatly diminished, by classing* those together in which there is a similarity in some one point. Eminent naturalists have at different times exerted their talents to perform this task. Tournefort is a name

* See the Classes, p. 10.

that was highly distinguished on this list, before the time of Linnæus, whose superior genius has raised him above all his predecessors: his system is now universally adopted.

FINIS.

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